CLAIMS

[1] A wireless transmission system in which a plurality of wireless stations each transmit a signal to a receiving station, wherein a path diversity system is formed by a transmitter-side wireless station, a multi-path channel and the receiving station, the wireless transmission system comprising:

a transmission timing control section for determining a transmission start timing, at which to start the signal transmission, to be a timing obtained by delaying a reference timing to be a reference for the signal transmission by a predetermined delay amount;

a transmitting section for transmitting the signal at the transmission start timing determined by the transmission timing control section; and

a receiving section provided in the receiving station for receiving the transmitted signal,

wherein the predetermined delay amount is determined so that: signals are received by the receiving section at a plurality of signal-receiving timings; the number of signal-receiving timings is less than or equal to a predetermined maximum number of effective branches; a difference between the signal-receiving timings is greater than or equal to a predetermined delay resolution; and a difference between a maximum value and a minimum value of the signal-receiving timing is less than or equal to a predetermined maximum delay.

[2] The wireless transmission system according to claim 1, wherein the predetermined maximum number of effective branches, the predetermined delay resolution and the predetermined maximum delay are set to values such that a plurality of delayed waves can be received with path diversity.

[3] The wireless transmission system according to claim 1, wherein:

the transmission timing control section and the transmitting section are provided in the wireless station; and

the reference timing stored in each wireless station is a predetermined timing, and the wireless stations store the same reference timing.

[4] The wireless transmission system according to claim 1, wherein:

the wireless transmission system further comprises a transmitting station for transmitting, to the wireless stations, a signal to be transmitted to the receiving station;

the transmitting station includes a transmitter signal transmitting section for transmitting, to the wireless stations, a signal to be transmitted to the receiving station;

the transmission timing control section and the transmitting section are provided in the wireless station;

the wireless station includes:

a relay receiving section for receiving a signal transmitted by the transmitter signal transmitting section; and

a timing detection section for detecting a timing at which the signal is received by the relay receiving section;

the transmission timing control section determines the reference timing to be the timing detected by the timing detection section; and

the transmitting section transmits a signal received by the relay receiving section to the receiving station.

[5] The wireless transmission system according to claim 3, wherein the timing detection section detects a unique word contained in the signal.

[6] The wireless transmission system according to claim 1, wherein:

the wireless transmission system further comprises a transmitting station for transmitting, to the wireless stations, a signal to be transmitted to the receiving station;

the transmitting station includes:

a transmitter signal transmitting section for transmitting, to the wireless stations, a signal to be transmitted to the receiving station;

a delay amount selecting section for selecting the

predetermined delay amount from among a plurality of candidate values;

a re-transmission start timing determining section for determining a re-transmission start timing, at which to transmit the signal to the receiving station, to be a timing obtained by delaying the reference timing by the delay amount selected by the delay amount selecting section; and

a re-transmit signal transmitting section for transmitting the signal to the receiving station at the re-transmission start timing determined by the re-transmission start timing determining section;

the transmission timing control section and the transmitting section are provided in the wireless station;

the wireless station includes a relay receiving section for receiving a signal transmitted by the transmitter signal transmitting section; and

the transmitting section transmits a signal received by the relay receiving section to the receiving station.

[7] The wireless transmission system according to claim 1, wherein:

the wireless transmission system further comprises a transmitting station for transmitting, to the wireless stations, a signal to be transmitted to the receiving station;

the transmitting station includes:

a delay amount selecting section for selecting, from among a plurality of candidate values, a delay amount to be given to a signal transmitted by the wireless station;

a delay amount adding section for adding the delay amount selected by the delay amount selecting section to the signal; and

a transmitter signal transmitting section for transmitting, to the wireless station, the signal to which the delay amount has been added by the delay amount adding section;

the transmission timing control section is provided in the wireless station;

the wireless station includes:

a relay receiving section for receiving the signal to which the delay amount has been added, transmitted by the transmitter signal transmitting section;

a delay amount extracting section for extracting the delay amount from a signal received from the relay receiving section;

the transmission timing control section determines the transmission start timing to be a timing obtained by delaying the reference timing by the delay amount extracted by the delay amount extracting section; and

the transmitting section transmits a signal received by the relay receiving section to the receiving station.

[8] The wireless transmission system according to claim 1, wherein:

the wireless transmission system further comprises a transmitting station for transmitting, to the wireless stations, a signal to be transmitted to the receiving station;

the transmission timing control section and the transmitting section are provided in the transmitting station;

the transmitting station includes a delay amount selecting section for selecting, from among a plurality of candidate values, a delay amount to be given to a signal transmitted to each wireless station;

the transmission timing control section determines the transmission start timing to be a timing obtained by delaying the reference timing by the delay amount selected by the delay amount selecting section;

the transmitting section transmits the signal to the wireless station at the transmission timing; and

the wireless station includes:

a relay receiving section for receiving a signal transmitted from the transmitting station; and

a relay transmitting section for transmitting the signal received by the relay receiving section to the receiving station.

[9] The wireless transmission system according to claim 7,

wherein:

the plurality of wireless stations are arranged so that wireless stations located within a predetermined distance from each other have communication ranges partially overlapping with each other;

the transmitting station further includes a delay amount adjusting section for adjusting the delay amount so that signals transmitted from the wireless stations that are assigned the same delay amount as the delay amount selected by the delay amount selecting section arrive at the receiving station at the same timing;

the delay amount adding section produces a delay signal indicating the delay amount adjusted by the delay amount adjusting section; and

the receiving section receives signals transmitted from wireless stations that are adjacent to each other at different timings.

[10] The wireless transmission system according to claim 8, wherein:

the plurality of wireless stations are arranged so that wireless stations located within a predetermined distance from each other have communication ranges partially overlapping with each other;

the transmitting station further includes a delay amount

adjusting section for adjusting the delay amount so that signals transmitted from the wireless stations that are assigned the same delay amount as the delay amount selected by the delay amount selecting section arrive at the receiving station at the same timing;

the transmission timing control section determines the transmission start timing to be a timing obtained by delaying the reference timing by the delay amount adjusted by the delay amount adjusting section; and

the receiving section receives signals transmitted from wireless stations that are adjacent to each other at different timings.

[11] The wireless transmission system according to claim 9, wherein the wireless stations are arranged in a linear pattern.

[12] The wireless transmission system according to claim 10, wherein the wireless stations are arranged in a linear pattern.

[13] The wireless transmission system according to claim 11, wherein there are a plurality of groups of wireless stations, each group including wireless stations arranged in the linear pattern, and the groups of wireless stations are arranged parallel to each other.

[14] The wireless transmission system according to claim 12, wherein there are a plurality of groups of wireless stations, each group including wireless stations arranged in the linear pattern, and the groups of wireless stations are arranged parallel to each other.

[15] The wireless transmission system according to claim 4, wherein the number of predetermined delay amounts is equal to the maximum number of effective branches.

[16] The wireless transmission system according to claim 1, wherein the number of predetermined delay amounts is two.

[17] The wireless transmission system according to claim 1, wherein:

the wireless transmission system further comprises a delay amount selecting section for selecting the predetermined delay amount from among a plurality of candidate values;

the delay amount to be selected by the delay amount selecting section is determined in advance; and

the transmission timing control section determines the transmission start timing based on the delay amount selected by the delay amount selecting section.

[18] The wireless transmission system according to claim 1,

wherein:

the wireless transmission system further comprises a delay amount selecting section for randomly selecting the predetermined delay amount from among a plurality of candidate values; and

the transmission timing control section determines the transmission start timing based on the delay amount selected by the delay amount selecting section.

[19] The wireless transmission system according to claim 1, wherein an orthogonal frequency division multiplexing scheme is used as the modulation scheme and the demodulation scheme.

[20] The wireless transmission system according to claim 1, wherein a PSK-VP scheme is used as the modulation scheme.

[21] A wireless station for use in a wireless transmission system in which a plurality of wireless stations each transmit a signal to a receiving station, wherein a path diversity system is formed by a transmitter-side wireless station, a multi-path channel and the receiving station, the wireless station comprising:

a transmission timing control section for determining a transmission start timing, at which to start the signal transmission, to be a timing obtained by delaying a reference timing to be a reference for the signal transmission by a predetermined

delay amount; and

a transmitting section for transmitting the signal at the transmission start timing determined by the transmission timing control section,

wherein the predetermined delay amount is determined so that: signals are received by the receiver side at a plurality of signal-receiving timings; the number of signal-receiving timings is less than or equal to a predetermined maximum number of effective branches; a difference between the signal-receiving timings is greater than or equal to a predetermined delay resolution; and a difference between a maximum value and a minimum value of the signal-receiving timing is less than or equal to a predetermined maximum delay.

[22] A transmitting station for use in a wireless transmission system for transmitting a signal to a receiving station via a plurality of wireless stations, wherein a path diversity system is formed by a transmitter-side wireless station, a multi-path channel and the receiving station, the transmitting station comprising:

a delay amount selecting section for selecting, from among a plurality of predetermined delay amounts, a delay amount to be given to a signal transmitted to each wireless station;

a transmission timing control section for determining a transmission start timing, at which to start the signal

transmission, to be a timing obtained by delaying a reference timing to be a reference for the signal transmission by the delay amount selected by the delay amount selecting section; and

a transmitting section for transmitting the signal to the wireless station at the transmission start timing,

wherein the predetermined delay amount is determined so that: signals are received by the receiver side at a plurality of signal-receiving timings; the number of signal-receiving timings is less than or equal to a predetermined maximum number of effective branches; a difference between the signal-receiving timings is greater than or equal to a predetermined delay resolution; and a difference between a maximum value and a minimum value of the signal-receiving timing is less than or equal to a predetermined maximum delay.

[23] A method for use in a wireless transmission system, in which a plurality of wireless stations each transmit a signal to a receiving station, for transmitting a signal to the receiving station, wherein a path diversity system is formed by a transmitter-side wireless station, a multi-path channel and the receiving station, the method comprising the steps of:

determining a transmission start timing, at which to start the signal transmission, to be a timing obtained by delaying a reference timing to be a reference for the signal transmission by a predetermined delay amount;

transmitting the signal at the transmission start timing determined in the step of determining the transmission start timing; and

receiving the transmitted signal at the receiving station,

wherein the predetermined delay amount is determined so that: signals are received at the receiving station at a plurality of signal-receiving timings; the number of signal-receiving timings is less than or equal to a predetermined maximum number of effective branches; a difference between the signal-receiving timings is greater than or equal to a predetermined delay resolution; and a difference between a maximum value and a minimum value of the signal-receiving timing is less than or equal to a predetermined maximum delay.

[24] A method for use in a wireless transmission system, in which a plurality of wireless stations each transmit a signal to a receiving station, for transmitting a signal from each wireless station, wherein a path diversity system is formed by a transmitter-side wireless station, a multi-path channel and the receiving station, the method comprising the steps of:

determining a transmission start timing, at which to start the signal transmission, to be a timing obtained by delaying a reference timing to be a reference for the signal transmission by a predetermined delay amount; and

transmitting the signal at the transmission start timing determined in the step of determining the transmission start timing,

wherein the predetermined delay amount is determined so that: signals are received by the receiver side at a plurality of signal-receiving timings; the number of signal-receiving timings is less than or equal to a predetermined maximum number of effective branches; a difference between the signal-receiving timings is greater than or equal to a predetermined delay resolution; and a difference between a maximum value and a minimum value of the signal-receiving timing is less than or equal to a predetermined maximum delay.

[25] A method for transmitting a signal from a transmitting station to a receiving station via a plurality of wireless stations, wherein a path diversity system is formed by a transmitter-side wireless station, a multi-path channel and the receiving station, the method comprising the steps of:

selecting, from among a plurality of predetermined delay amounts, a delay amount to be given to a signal transmitted to each wireless station;

determining a transmission start timing, at which to start the signal transmission, to be a timing obtained by delaying a reference timing to be a reference for the signal transmission by the delay amount selected in the step of selecting a delay amount; and

transmitting the signal to the wireless station at the transmission start timing,

wherein the predetermined delay amount is determined so that: signals are received by the receiver side at a plurality of signal-receiving timings; the number of signal-receiving timings is less than or equal to a predetermined maximum number of effective branches; a difference between the signal-receiving timings is greater than or equal to a predetermined delay resolution; and a difference between a maximum value and a minimum value of the signal-receiving timing is less than or equal to a predetermined maximum delay.